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Making the Case for Distributed Testing

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Distributed testing is the method of linking various Live, Virtual, and Constructive (LVC) sites and capabilities together to conduct the Test and Evaluation (T&E) of a system or system-of-systems in a distributed environment. This is normally done in lieu of a large-scale "open air" test using actual live operational hardware for all systems involved. Conducting distributed testing complements live-only testing and provides the means for rapid integration of systems early in their developmental life cycle. It also provides an efficient means of adding realism to T&E by providing system representations not otherwise available, and/or enabling interrelated systems not otherwise available, in realistic numbers. Distributed testing enhances the cross-flow of test data between T&E agencies and allows for the early integration of Operational Test (OT) influence into Development Test (DT). Conducting distributed test events will save acquisition and T&E programs time and money, as well as reduce risk. It can be used to develop the operationally representative Joint Mission Environment (JME) that can be used to evaluate the interoperability capabilities of a system or system-of-systems in preparation for "Net-Readiness" certification. This distributed JME can be developed at a fraction of the cost of live open air scenarios and provides the capability to evaluate technical and operational performance for individual systems and systems-of-systems in realistic environments. Even with the obvious benefits, the concept of distributed testing is only very slowly gaining recognition and acceptance from acquisition program managers and the T&E community. This article examines the challenges of conducting distributed testing and provides an update on what is being done to mitigate those challenges and to ensure success for programs electing to take advantage of the potential of distributed testing methodologies.

Key words: Constructive T&E; data repository; distributed live; joint mission environment; joint system effectiveness; net-readiness; operation effectiveness; system-of-systems; virtual.

"Distributed LVC T&E is here, but it's not being used."[1] *(Rear Admiral Bill McCarthy, USN—retired)*

Defined policies and guidance for conducting distributed test have been in place for quite some time. The 2004 Department of Defense (DoD) Strategic Planning Guidance (SPG) for Joint Testing in Force Transformation (DoD 2004a) highlighted the development and fielding of joint force capabilities requiring adequate and realistic T&E in a joint operational context. To do this, the SPG recommended that the DoD provide new testing capabilities and institutionalize the evaluation of joint system effectiveness as part of new capabilities-based processes. As a result of this SPG, the Director, Operational Test and Evaluation (DOT&E), was tasked to develop the DoD Testing in a Joint Environment Roadmap (DoD 2004b). This document, approved by the Deputy Secretary of Defense in November 2004, states that current test planning processes must be updated and expanded to "clearly

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indentify needs for adequate testing of joint warfighting systems-of-systems in their mission environment." The roadmap also states that "today's limited availability of forces to support T&E will be compounded when joint mission capabilities are tested in assigned mission environments." Further, "a persistent, robust modern networking infrastructure for systems-of-systems engineering, Developmental T&E (DT&E), and Operational T&E (OT&E) must be developed that connects distributed LVC resources, enables real-time data sharing and archiving, and augments realistic OT&E/Initial OT&E (IOT&E) of joint systems and systems-of-systems" (DoD 2004b).

A Chairman of the Joint Chiefs of Staff Instruction released in 2008 defines the net-ready Key Performance Parameter (KPP) as a mandatory element in the complete life cycle of DoD systems to include the developmental phase and testing process (CJCSI 2008). CJCSI 6212.01E states that it is Joint Staff policy to ensure that "DoD components develop acquire, deploy, and maintain systems that (1) meet the essential operational needs of U.S. forces; (2) are interoperable with existing and proposed standards, defined interfaces, modular design; (3) are supportable over the existing and planned global information grid (GIG); and (4) are interoperable with allies, coalition partners and other U.S. and local agencies as appropriate." CJCSI 6212.0E further states that "…testing will verify the operational effectiveness of the information exchanges of the system under test with all its enabling systems." (CJCSI 2008).

An argument in support of distributed test can also be found in a recent memorandum by DOT&E to the commanders of the Service Operational Test Agencies. The memorandum says, in part,

> *"Thus, operational effectiveness and suitability must be evaluated and reported on the basis of whether a system can be used by soldiers, sailors, airmen, and Marines to accomplish a combat mission. The appropriate environment for that evaluation includes the system under test and all interrelated systems (that is, its planned or expected environment in terms of weapons, sensors, command and control, and platforms, as appropriate) needed to accomplish an end-to-end mission in combat. The data used for evaluation are appropriately called measures of effectiveness, because they measure the military effect (mission accomplishment) that comes from the use of the system in its expected environment. This statement of policy precludes measuring operational effectiveness and suitability solely on the basis of system-particular performance parameters."*[2]

The DoD policies outlined above require that joint interoperability and net-readiness testing be conducted during the acquisition and fielding process for new systems. Satisfying the interoperability and measures of effectiveness requirements stated above as well as net-ready KPP compliance will require the testing of the interactions of multiple systems at the same time. This will then present a program manager with three options:

1. Use conventional, live, open air–only, T&E methodologies to provide a representative and realistic *joint operational environment*. This usually requires building a large and expensive T&E event that is subject to limiting factors such as low density/high demand, real-world operational priorities and are generally not co-located at the desired T&E venue. Relying solely on live systems is often impractical, usually too expensive, and sometimes simply impossible.
2. Use a Modeling and Simulation (M&S)–only methodology with no live systems. In this case, regardless of how well a model or constructive simulation is developed, it will be very difficult to garner credibility on how the System Under Test (SUT) will function in the *real world*. An M&S-only T&E strategy, without at least some influence of the expected operating environment will simply not be acceptable by the approvers of the program's Test Evaluation Master Plan or the operational forces that will be required to use the system. For credible T&E, there must be some level of influence from a real system and/or a real operator.
3. Use a mixture of live, Hardware-In-the-Loop (HWIL), virtual simulations, and constructive capabilities in a distributed environment. That is, connect the various testing components to form a distributive operating environment for the SUT, linking all its enabling systems. In this distributed environment, the testing components and systems need not be co-located. This distributed test approach will allow the program manager to customize the T&E methodology to capitalize on the particular advantages of each capability as it is needed. Capitalizing on a distributed test infrastructure, testing components, and systems not previously available can now be fully integrated early and continuously in the developmental and T&E process. Each test event need not be solely large scenario–driven events or incorporate the available LVC assets all at once. One event may include live and virtual capabilities, another may include virtual and constructive, while a third may link multiple HWIL facilities with a live

operator. Smaller-scale testing can be done using a distributed infrastructure to provide technical risk reduction prior to linking the environment of *all interrelated systems* in a larger test. Using distributed test capabilities may prove to be the simplest, quickest, and cheapest way to avoid the pitfall of "measuring operational effectiveness and suitability solely on the basis of system-particular performance parameters."[3]

The complexity and expense of today's military systems clearly demonstrate the need to test early and often throughout the development and fielding process. Early testing of a system's capability to operate in its intended environment will allow designers and system engineers to identify and correct fundamental issues with performance and interoperability before they become operational specifications. As the transition to realize net-centric warfare is accelerated, the requirement to successfully demonstrate systems interoperability will increase. Thus, the need to use distributed test in a joint mission environment will increase.

That being said, how can program managers and the rest of the T&E community be convinced to make use of the advantages of distributed test? What is the process? What are the challenges of distributed test? What's being done to mitigate those challenges? How does a range or facility begin to transition to distributed test? While the concept of distributed test has not yet fully caught on, it is my belief that the T&E community is in the walking phase just prior to beginning a run. It is my intent to address each of these questions in an effort to quicken our pace a bit.

What is the process for conducting distributed test?

In December 2005, the DoD directed the development of the Joint Mission Environment Test Capability (JMETC) Program to provide the test infrastructure necessary for conducting joint distributed test events by cost-effectively integrating LVC test resources configured to support the users' specific needs for each event. JMETC was placed under the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD [AT&L]), with responsibility for execution assigned to the Director, Test Resource Management Center (TRMC). In October 2006, the JMETC Program Management Office was established under the TRMC. Conducted during the summer of 2007, Integral Fire 07 represented the inaugural use of the JMETC infrastructure to formally support a distributed test. Ten months after JMETC's inception, the JMETC network was established at five locations, and JMETC assisted in successfully linking 19 sites across three network enclaves using the United States Joint Forces Command (USJFCOM) Joint National Training Capability (JNTC)-sponsored Network Aggregator at Patuxent River. JMETC was a major contributor to Integral Fire 07 providing technical capabilities, infrastructure management, and technical assistance in test event planning, preparation, and execution (Test and Training Enabling Architecture [TENA] 2008). In their After Action Report, the Integral Fire 07 staff reported that they were 100% effective in data collection and all test objectives were met.

The Testing in a Joint Environment Roadmap (DoD 2004b) recognized the need to expand beyond the single system T&E environment to the distributed joint mission environment, so the TRMC assigned JMETC the mission of providing a persistent capability for linking distributed facilities, therefore enabling DoD customers to develop and test warfighting capabilities in a joint context. As such, JMETC provides the DoD T&E community with the *persistent network infrastructure* (network, integration software, tools), as well as the resident distributed test *expertise* needed for the connection and use of distributed LVC resources to support the DT&E and OT&E of joint systems and systems-of-systems. JMETC now provides a DoD-wide capability for the T&E of a weapon system in a joint context to include DT, OT, interoperability certification, net-ready KPP compliance testing, and joint mission capability portfolio testing. This corporate, persistent, and reusable capability avoids the recurring cost, time, and effort that individual programs must endure to develop an expensive and temporary LVC infrastructure for each distributed event.

To accomplish its mission, the JMETC Program

- maintains a core reconfigurable infrastructure that enables the rapid integration of LVC resources;
- has integrated existing products that provide readily available connectivity over existing DoD networks; standard data transport solutions, tools, and utilities for planning and conducting distributed integrations; and a reuse repository; and
- provides customer support, both on-site and help desk, *facilitating* the use of JMETC to integrate LVC resources.

The JMETC Program relies heavily on the collaboration of the Services, USJFCOM, and other T&E agencies to build an infrastructure *relevant* to current and future requirements. In order to facilitate and formalize this exchange process, the JMETC Program Office instituted the JMETC Users Group. The JMETC Users Group is composed of technical and

management representatives from acquisition program offices, T&E organizations and programs, HWIL facilities, virtual simulation facilities, and other laboratories and ranges. These are the JMETC customers, potential customers, network providers, and tool developers of the JMETC infrastructure and products. The Users Group focuses on technical requirements and solutions and makes recommendations to resolve technical issues associated with distributed test. This focus includes improving integration capabilities, connectivity and modernization issues, middleware and objects model requirements, and change coordination. The JMETC Users Group also provides a forum for customers to outline their customer support requirements. In addition, the JMETC Users Group performs the important function of consolidating the requirements of the distributed test community and making recommendations to improve JMETC processes and procedures.

JMETC customers have discovered that a standout benefit of this capability is the cost and time savings. An example of the benefit of using JMETC's capabilities comes from the U.S. Air Force (USAF) Joint Expeditionary Force Experiment (JEFX). JEFX is a Chief of Staff of the Air Force–directed series of experiments that combine LVC forces to create a near-seamless warfighting environment in order to assess the ability of selected initiatives to provide needed capabilities to warfighters. JEFX initiatives are new operational concepts and technologies designed to close capability gaps and provide means to satisfy warfighter requirements. JMETC has been a supporting partner for JEFX since early 2008. The assessment of multiple initiatives using the distributed methodologies employed by JEFX is one of the major successes of the program and contributes to the overall success of JEFX (TENA 2010). The After Action Report for JEFX 2009 reported that

> *"The JMETC network was successfully used and promises to become an effective, persistent network for tests and experimentation. Overall communications, networks and data links were very stable, 'reach back' to Langley and technical support was successful."*

The cost savings to JEFX by using the JMETC Infrastructure and support was reported at $4.0 million, and the recommendation was made to integrate other USAF T&E capabilities "unto the JMETC Network."[4]

Also, as part of JEFX 2010, the Spirit Integrated Collaborative Environment (ICE) test event provided an assessment of the Link 16 interoperability for the Air Force B-2 and Airborne Warning and Control System (AWACS). Using a distributed network provided by JMETC, the assessment included a mission-ready B-2 aircraft parked on the ramp, manned by a mission-ready crew (not test pilots) and was conducted at a fraction of the cost of a live open air range event. The distributed nature of Spirit ICE allowed the assessors to investigate digital target transfer capability and situational awareness in a realistic, time-sensitive targeting scenario using tactical command and control.

While cost and time savings are certainly significant factors in adopting JMETC as a joint distributed test solution, a third key benefit is risk reduction. JMETC's unique total package capability allows the T&E customer to minimize the technical risk associated with planning for and providing the distributed test infrastructure in order for the focus to truly remain on test requirements. JMETC support includes experienced and highly skilled distributed test experts who are forward deployed for distributed planning and operations; a modern, tested, and reliable network already in place; and data exchange solutions that have already been tested, proven, and put into practice. JMETC is also the T&E community's enterprise-level focal point for collecting and maintaining "lessons learned" and implementing resource "reuse" repository for improving the DoD distributed test capability. Distributed test lessons learned and other important support information are available free of charge online at the JMETC Reuse Repository (www.jmetc.org).[5] JMETC actively captures customers' needs and requirements on a continuous basis from program planning through distributed event execution and provides the full support needed for successful distributed test events *(Figure 1)*. For this reason, program managers should consider contacting JMETC to investigate if distributed test is a valid solution for their testing requirements.

What are the challenges for implementing distributed test?

Historically, acquisition program managers and the T&E community at large have been doubtful of the value distributed test brings to their test programs. This doubt or lack of acceptance is because they see distributed test as bringing risk to their program rather than reducing risk. There is also an underlying perception that they will "lose control" of their test and their data. Some may believe distributed test, using LVC assets, increases the risk to their system's performance as well as their overall program schedule and budget. Therefore, some program managers are hesitant to take advantage of the benefits of distributed

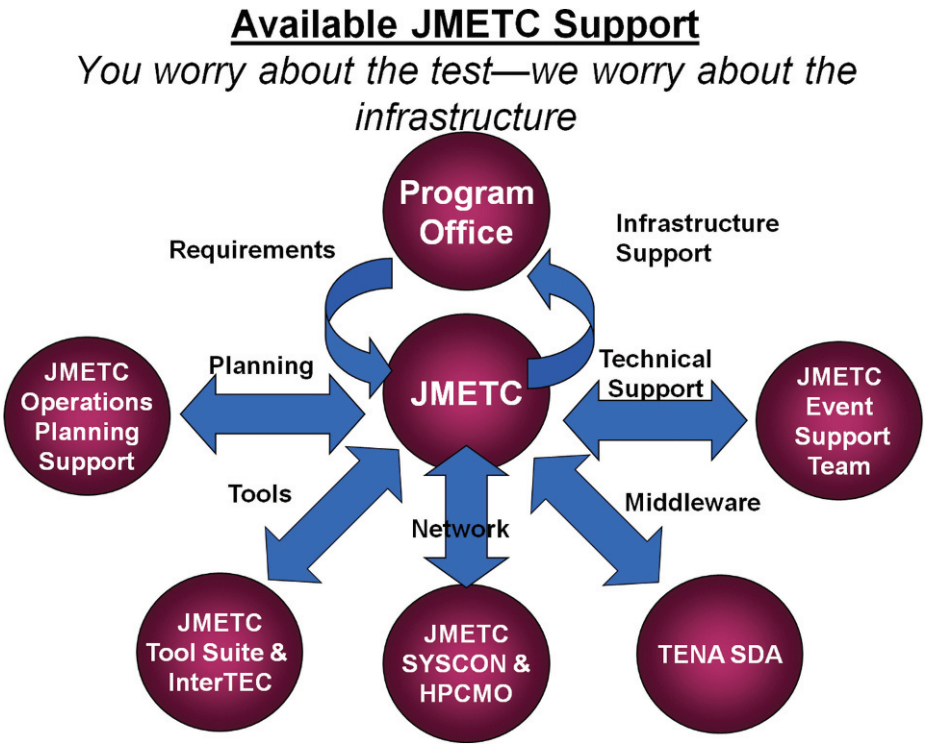

Figure 1. Support given by Joint Mission Environment Test Capacity (JMETC) to the Department of Defense distributed test community. JMETC provides infrastructure support based on the requirements provided by the program office. As a fundamental part of its support, JMETC assists in distributed test planning, provides the necessary test support tools, manages the network, and provides the middleware and technical support necessary for customers to conduct distributed test events.

test or to incorporate distributed test in their test planning process.

However, the reality is that the proper use of distributed test will require less hardware, less time, and less money to conduct T&E of a system earlier in its acquisition timeline and in its appropriate operating environment. This will allow program managers to fix problems earlier and with less cost. As noted before, not all distributed test events will need to be large-scale and expensive events. JMETC has supported a variety of large and smaller scale distributed test events. A sampling of significant events includes:

- Future Combat Systems (FCS, the precursor to the Army's Brigade Combat Team Modernization Program) Joint Battlespace Dynamic Deconfliction (JBD2) in 2008. The event was a significant effort designed to assess the readiness of FCS test technologies in preparation for its Milestone C test activities. JMETC provided the persistent network connectivity, software interfaces, and software tools needed to support the test. For the event, JMETC connected 16 laboratories with over 60 applications from U.S. Army, Air Force, Navy, and Marine sites. Other network enclaves integrated into the JMTEC network via the Aggregation Router included the Air Force–ICE (AF-ICE) and the Joint Training and Experimentation Network (JTEN). During JBD2, JMETC demonstrated the ability to support a customer's design, integration, development, and execution of a large and complex joint distributed test.
- F/A-18 Interoperability Check. When personnel from Naval Air Station (NAS) China Lake attended a JMETC Users Group in May of 2008, they were introduced to the program and learned which sites were available. Following the users group, the data link testers called the JMETC Program Manager and requested support linking the F/A-18 lab at China Lake, California, with the F-16 lab at Eglin Air Force Base (AFB), Florida. Within 2 days, after verifying ports and protocols were open at site firewalls, JMETC announced the infrastructure was ready, and 2 days later the first interoperability test between the systems was completed. The initial test identified problems, so the F/A-18 lab completed software modifications that day, and a successful re-test was accomplished the following day. One week from initial coordination to a completed distributed test and solution!

- The Joint Surface Warfare (JSuW) Joint Capability Technology Demonstration (JCTD) sponsored by USN NAV/AIR PMA-201 on behalf of U.S. Pacific Command (USPACOM) evaluated Joint Surface Warfare Net-Enabled Weapons (NEW) and the third-party targeting process. The JSuW JCTD integrated Link 16 J11 message set into existing software for the JSTARS and Littoral Surveillance Radar System (LSRS) to ensure interoperability with the Joint Stand-Off Weapon (JSOW-C-1) and the F/A-18 E/F, as well as other weapons delivery platforms and command and control assets. This event executed a full week of high fidelity man-in-the-loop tests on time and with all test objectives met and is a prime example of early risk reduction. The JMETC infrastructure was able to peer a virtual F/A-18E/F Low Cost Trainer at St. Louis (Boeing) with a virtual P-3 LSRS at McLean (MITRE) and a virtual joint surveillance and target attack radar system (JSTARS) at Melbourne (Northrop Grumman). For the 2009 JSuW events, DoD and industry sites on disparate networks were connected to support the event requirements with an "idea-to-execution" schedule of only 3 months.

The Secretary of the Air Force Modeling and Simulation Policy Division (SAF/XCDM) has signed a support agreement that incorporates JMETC into the event planning process as an integration solution for Air Force Distributed LVC event requirements. As of October 1, 2009, JMETC has assumed infrastructure support responsibility for distributed LVC tests and events sponsored by the Air Force. Air Force partners using AF-ICE will depend on JMETC to provide a persistent and dependable distributed infrastructure. The Army Cross Command Collaboration Effort (3CE) is developing a plan to move to the JMETC Infrastructure over a 3-year period and the Navy Distributed Engineering Plant (DEP) is developing a plan to partner with JMETC.

The message to program managers is that JMETC is operational now and provides the infrastructure necessary for distributed test available today. In supporting these and others programs and events, JMETC has established a track record of responsive support using a reliable infrastructure. In the three and one-half years since Integral Fire 07, the JMETC infrastructure has grown to over 50 sites and is being used every week. JMETC has demonstrated the capability to support multiple T&E customers during a single distributed test event, as well as the ability to move large amounts of data in support of T&E requirements. The bottom line is that JMETC saves T&E programs time and money.

Program managers and test directors can use distributed test through the JMETC infrastructure to take advantage of more frequent, smaller events, and even one-on-one systems interoperability tests as well as large-scale scenario-based testing. Distributed test can be a mix of various combinations of LVC assets and capabilities. Having the persistent infrastructure capability that JMETC provides will allow program managers to find problems early in the system's developmental cycle—when they are cheaper and easier to fix. The use of smaller scale and frequent distributed test events will allow T&E programs to test earlier and test more often in a program's life cycle. Operational testers will be able to leverage appropriate developmental test data and provide an early operational influence to a systems development. As stated by the Director, Operational Test & Evaluation, Deputy Director for Net-Centric and Space Systems, "There is not enough time to wait until the end of a program to find out what's wrong."[6] All this, in turn, will have a transformational affect on the ability of program managers to field systems that are truly interoperable and net-ready for operational users—quicker, cheaper, and at less risk!

It is true that there are technical challenges to employing distributed test. Various technical issues have been identified and resolved through the JMETC Users Group. Other issues continue to be worked. Some of those challenges include difficulties in satisfying the DoD Information Assurance Certification and Accreditation Process (DIACAP); ensuring that infrastructure is capable of transporting large amounts of data and within acceptable latency limits; and addressing the requirements for Multi-Level Security (MLS) and cross-domain solutions (i.e., how different classification levels are to be integrated into a common infrastructure, or how to pass data between domains without compromising security).

However, significant progress has been made in resolving these and other technical issues. By far the most critical challenge for distributed test is misperception. The perceived risk of the distributed test process and infrastructure is the determining factor that must be overcome in order to convince program managers and other T&E agencies to embrace the concept of distributed test. "We are working the engineering element to make distributed test work…The hard part is solving the human element."[7] If we can solve the issue of hesitancy with distributed test, we can solve the rest of the technical issues as well.

What is being done to mitigate the implementation challenges?

The JMETC Program is actively engaged in changing the paradigm of distributed test. The prime targets are the acquisition program managers and the T&E community. JMETC has an aggressive outreach program used to cause testers to think about distributed test. Participating in conferences, briefings to project managers and DoD Senior Leaders, and articles (such as this one) help to advocate the advantages of distributed test to the acquisition test community. However, JMETC is also involved in solving the technical problems associated with distributed test. JMETC recently completed an effort leading a tiger team to streamline DIACAP procedures in cooperation with the Services. The tiger team recently completed its work and presented a list of actionable recommendations to the DoD Information Assurance community. The Services are already in the process of implementing some of the recommendations. For more details on the progress of the DIACAP tiger team, go to the JMETC Web site at www.jmetc.org. JMETC is also actively working to mitigate multi-level security challenges by participating in a Central Test and Evaluation Investment Program (CTEIP) project that is designed to mitigate three categories of MLS issues (classification, proprietary, and coalition). JMETC is providing data on distributed infrastructure performance that will be used to establish verification, validation, and accreditation guidelines and policy. In a recent test event supported by JMETC, the U.S. Navy Program Executive Office, Integrated Weapons Systems, Integrated Combat Systems (PEO IWS 1.0), in conjunction with Wallops Island Surface Combat Systems Center (SCSC) and the Naval Surface Warfare Center (NSWC) at Dahlgren, Virginia, ran a successful 30-hour stress test to baseline Aegis systems capability. This test included measuring the sites' capacity to harvest massive amounts of data over the JMETC infrastructure. The PEO IWS requirement was to be able to transmit 200 GB of data in 8 hours. With the JMETC infrastructure, they were able to transfer 313 GB in 8 hours 21 minutes. Before JMETC connectivity, PEO IWS would physically transport by car the data on hard drives between the two sites. Due to the success of JMETC's support, PEO IWS has recently signed a formal support agreement with JMETC that will allow them to expand their use of the JMETC infrastructure to include other sites to further streamline post-mission analysis of Aegis test data. In accordance with the support agreement, JMETC will provide a secure network for connectivity of PEO IWS test resources and project development efforts. Also, JMETC-sponsored products will be used in building, sustaining, and connecting the architecture to test resources required for PEO IWS test events. In short, PEO IWS will now be able to concentrate fully on their test events, and JMETC will concentrate on their distributed infrastructure.

JMETC employs a dedicated customer support team with extensive expertise in the JMETC infrastructure and distributed testing in general and will provide guidance and assistance in the use of the JMETC infrastructure. To ensure a successful test, the JMETC Program Office will assign dedicated personnel to each customer to assist with planning, preparation, integration, and execution of the customer's infrastructure requirements for the distributed LVC test event. The JMETC team is available to support and advise a customer beginning in the early phase of test planning development and to assist in developing distributed test requirements, alternatives to meet test requirements and planning for network characterization, network configuration, and connectivity testing. The key to success for any program in the use of distributed test will be including distributed requirements into early test planning documentation. JMETC is available to assist the program in incorporating distributed test requirements into test planning documents such as Test Evaluation Master Plans (TEMPs). Program managers need only contact JMETC to coordinate for support in evaluating potential distributed test strategies and then documenting distributed requirements into the TEMP.

During test execution, the JMETC team will be available for on-site support. Test execution support includes the development of test support tools and training as well as "on-call" or online technical support and network troubleshooting. JMETC will assist with data logging and data analysis tools after the test event, and network performance analysis before, during, and/or after event execution. An important aspect of the JMETC Program is the sharing of infrastructure and distributed testing lessons learned. The JMETC Reuse Repository is structured to give the user community easy access to general program information, questions and answers, lessons learned, opportunities for distributed test event collaboration, and insight into the capabilities of JMETC and other JMETC users. However, the test program retains complete control of the data and full control of authority to release to individuals and outside agencies. In addition, JMETC provides each of its sites and customers the capability of hosting their own space on the reuse repository to facilitate collaboration for specific events, tools, or sites. The JMETC Reuse Repository can be found at www.jmetc.org. Also available on the Web site is the JMETC Users Handbook, which provides current and potential customers a working knowledge of the JMETC program as well as how to utilize JMETC.

Conclusion

While we recognize that integrating a distributed requirement into test planning and execution can sometimes be a technical and cultural challenge, the T&E community is beginning to realize the real benefits of distributed test. It is a fact that the use of the JMETC persistent infrastructure lowers the cost to integrate systems together, decreases the time to integrate systems, and so lowers the cost to develop new systems. As the credibility of distributed test matures throughout the T&E community, more and more program managers will incorporate distributed test into their test strategies and documentation. Early testing in the intended operational environment will become commonplace. Compliance with interoperability, net-ready KPPs, and measures of operational effectiveness will increase the acquisition pipeline's effectiveness, as well as increase warfighting systems' overall combat capability; this means warfighters get a better product—cheaper and quicker! The joint infrastructure needed for distributed test is now in place, is operational, and is available to all JMETC's customers. I invite the T&E community, and program managers specifically, to contact the JMETC team for more information on how to use distributed test to support your program and T&E events. That is why JMETC exists. You can contact us directly or go to the JMETC Web site at www.jmetc.org. ❑

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Endnotes

[1]Rear Admiral Bill McCarthy, USN (retired), Former Deputy Director for Net-Centric Systems/Missile Defense in the Office of the Secretary of Defense – Director, Operational Test & Evaluation. Speaking at the International Test and Evaluation Association, Live Virtual and Constructive Conference, El Paso, Texas, on January 12, 2010.

[2]Director, Operational Test & Evaluation. Memo reporting Operational Test and Evaluation (OT&E) results, January 6, 2010.

[3]Director, Operational Test & Evaluation. Memo reporting Operational Test and Evaluation (OT&E) results, January 6, 2010.

[4]USAF Joint Expeditionary Force Experiment 09-3, After Action Report, p. 7.

[5]JMETC 2005 Reuse Repository located at www.jmetc.org. A password is required and must be requested to access the site.

[6]Rear Admiral Bill McCarthy, USN (retired), Former Deputy Director for Net-Centric Systems/Missile Defense in the Office of the Secretary of Defense – Director, Operational Test & Evaluation.

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